

Report of Collection-Level Assessment

Rhode Island State Archives
Providence, Rhode Island

March 11-15, 2019

Submitted on April 19, 2019 by:

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I. Introduction

Ashley Selima, State Archivist and Public Records Administrator at the Rhode Island State Archives, requested that the Northeast Document Conservation Center (NEDCC) in Andover, MA provide a collection-level conservation-needs assessment of the Archive's holdings. In response to this request, Bexx Caswell-Olson, Director of Book Conservation and Terra Huber, Assistant Paper Conservator, visited the site March 11-15, 2019 to perform an assessment of the material.

The purpose of this assessment was to:

- evaluate current space and storage conditions
- survey the condition of the material in the collection
- identify priorities for conservation treatment and rehousing

During the site visit 212 bound items and 162 unbound items were individually evaluated to determine their condition and conservation needs. While survey efforts were focused on the oldest and rarest items housed in the vault, items in other locations throughout the building were also evaluated. A spreadsheet containing a description of each item examined is attached to this report. Throughout the report, observation and recommendation specific to the collection are provided. Additional information and best practices are included in the appendices.

This report is intended for continuing reference for the Rhode Island State Archives and its staff. Throughout the report, the word 'staff' is used to indicate anyone responsible for collections care, whether they be professional staff, interns, volunteers, or some combination thereof. Many of the practices described may already be familiar, but they are included here to provide context for the recommendations that follow. Recommendations for additional resources can be found in the appendices.

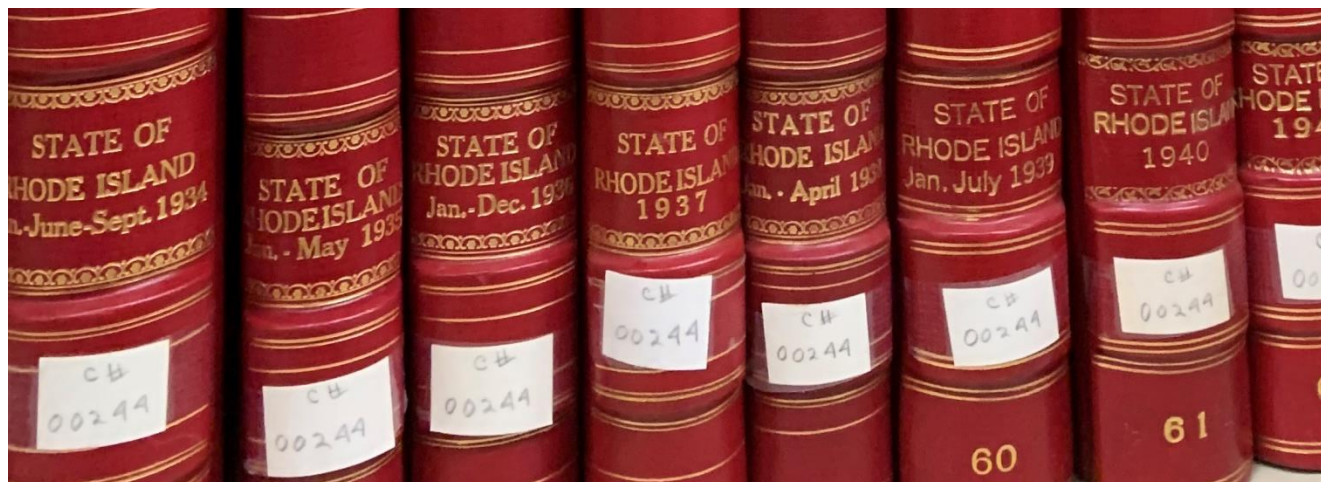
Archival and preservation supplies are recommended throughout the report. Most of these supplies are available from multiple vendors, and staff should select the one that best meets their needs in terms of cost, shipment method, etc. Examples of particular items are intended as illustrations, not recommendations of one supplier over another.

II. Nature of the Collection and Access

The State Archives is home to more than 10 million items in a variety of formats. Formats include bound materials, letters, documents, photographs, maps, blueprints, diazotypes, scrapbooks, framed items, ephemera, and objects. Holdings date from 1638-present. The building and its collections are open to all members of the public, free of charge.

The majority of the State Archives collection is housed in closed stacks, and is not available for browsing. Some materials are housed in the reading room and could potentially be browsed by patrons. Collection materials do not circulate and may only be used in the reading room under the supervision of Archives staff.

The reading room has several large tables which provide adequate workspace for large items, including oversize volumes and maps. Lighting is adequate. Book supports, snake weights, and gloves are available for patron use. Staff provides handling instructions to patrons, and there are written guidelines posted at the service desk.



Identification numbers are assigned according to a variety of different schema. For unbound materials, the ID number is generally written on the item as well as the folder or box housing the item. Numbering systems were not always consistent. For bound materials, the ID number is often handwritten on a label that has been adhered to the spine with pressure sensitive tape. Some bound volumes did not have spine labels and were difficult to identify.

Recommended Action(s):

- Encourage the use of gloves when handling photographs, film base materials (including microfilm, and textiles.
- Discontinue the use of pressure sensitive labels and tape to affix labels to bound volumes. The materials are considered damaging. See Appendix F for more information on best practices for marking bound materials.

III. Building, Environment, and Storage Conditions

Since 1991, the Rhode Island State Archives has leased space at 337 Westminster Street in Providence. Only the first floor of the building is occupied by the Archives. The basement contains records which are not under the purview of the Archives; the upper floors of the building are occupied by Charette High School. The high school has a separate entrance.

The rarest and most important items are housed in the vault, while non-rare materials are stored on open shelving in a closed stacks space. Some low-use records are kept off-site at Iron Mountain, and must be recalled for use.

A. Environment

The stacks, reading room, offices, and exhibition space are temperature controlled. These spaces are designed for human comfort, and temperature is controlled by Archives staff. Monitoring of temperature, humidity, and light levels does not occur in the above areas.

The vault has an independently controlled HVAC system which is set to 68-70 degrees and 55% relative humidity. Air filters are changed twice a year. The environment in the vault is monitored with the use of a hygrothermograph that produces a paper readout. Readings are logged weekly. The paper readout is retained for one (1) year. It is unknown if the hygrothermograph has been calibrated recently.



Left:

Hygrothermograph located in the Archives vault.
Temperature : ~70 degrees
Relative Humidity: ~ 30%

Based on available data, environmental conditions appear stable. During our visit, we observed that the temperature and humidity in the vault are at ideal or near ideal set points for book and paper based materials. However, the vault also contains a variety of other formats including magnetic media, audio recordings, film, glass plate negatives, lantern slides, and film base negatives. Cold storage is recommended for these items, especially for nitrate film which is highly flammable. For more info, see Appendix A, Section A and Appendix D, Section F.

Additional information on best practices for storage environments can be found in Appendix A.

Recommended Action(s):

- Hygrothermographs need to be calibrated regularly to maintain accuracy. For more information, see the National Park Service's Conserve-O-Gram 3.2 - Calibration of Hygrometers and Hygrothermographs at <https://www.nps.gov/museum/publications/consveogram/03-02.pdf>
- Add additional environmental monitors in the vault and in the reading room, stacks area, and exhibition area. This will provide a better picture of the overall environment and any possible problem areas. Consider upgrading to digital dataloggers and using software such as eClimate Notebook for more comprehensive data tracking. See Appendix A, Section A for more information.
- Environmental monitoring data should be retained for at least 5 years.
- Film base materials and magnetic media should be stored in cold storage for optimal preservation and to mitigate the risk of fire. For more information, see National Park Service

B. Protection from Light

Overhead fluorescent lighting is used throughout the building. U/V filtering sleeves are not in use.

Lights in the stacks area are kept on when the Archives is open. Windows on the west side of the building cast little to no light on to the stacks. Most items in this area are housed in records boxes and are well protected from light.

Rolled maps and plans and a small number of oversized bindings are housed on open shelving in the stacks. Few items are in boxes and these items are not well-protected from light. Many diazotypes and blueprints are stored in this area. Although they are rolled with the blank side facing out, any exposed areas of the print will suffer from light damage.

Bound volumes stored in the reading room are also more vulnerable to light damage. Most of these items do not have enclosures that would provide protection from light and dust.

The exhibition area at the front of the building has south facing windows. The windows are shaded by an awning and further protected by graphic panels applied to the glass. Overhead canned lighting is also present, but is not aimed directly at the exhibit cases. Light levels in this area are appropriate for exhibitions lasting no longer than 3 months.

Recommended Action(s):

- Although all visible light is damaging to collections, UV light poses the greatest threat. Add UV filtering sleeves to overhead fluorescent bulbs or replace fluorescent bulbs with LED tube lights. LED lights produce less UV light and less heat than traditional fluorescent or incandescent bulbs. Although the initial cost of purchasing bulbs is greater, LED bulbs require less maintenance and use less energy than traditional fluorescent bulbs. For more information on lighting see Appendix A, Section C.

C. Protection from Water

The Archives building is located in a floodplain and the basement often takes on water during wet weather. Although no Archives material is currently kept in the basement, portions of the collection have been stored in the basement in the past. Staff reported having to move records out of harm's way in the past.

The upper floors of the building are occupied by Charette High School. On occasion, the Archives has experienced water intrusion incidents caused by plumbing issues on the upper floor. Staff recalled several times when water flowed down the back wall of the building. No records were damaged, but without ongoing monitoring and maintenance, future plumbing issues could damage collections.

Staff also recalled at least once instance of the HVAC unit in the vault malfunctioning, causing water to leak into the space. Fortunately, it pooled in an aisle and collections were not damaged. A drip pan has been installed under the unit to catch small leaks.

Shelving throughout the Archives is set with the bottom shelf 2” off the ground. Due to a lack of space in the vault, material is shelved on top of shelving in most rows. Material is also shelved on top of shelving in the rolled storage area as well as in the reading room. This leaves these materials vulnerable to water from above.



Recommended Action(s):

- Where possible, place the bottom shelf of each shelving unit at least 4” off the ground. It may not be possible to do this in all areas of the Archives due to space constraints. This will protect items from water that has pooled on the floor during a leak or flood.
- Do not store materials on top of shelving. If materials must be stored on top of shelving due to space constraints cover materials with inert plastic sheeting.
- Install water alarms in areas with known water problems. Consider choosing a model that will send phone or text alerts when activated. This can alert staff to water issues that may arise after hours.

D. Protection from Fire

The stacks, reading room, offices, and exhibition space utilize a traditional wet pipe sprinkler system. A Halon 1301 fire suppression system has been installed in the vault. Fire extinguishers are placed throughout the building.

Recommended Action(s):

- Continue to maintain fire suppression systems through regular maintenance.
- Halon 1301 is no longer manufactured due to environmental concerns. When planning renovations, consider upgrading to a new clean agent system that is less harmful to the environment and to human health.

E. Protection from Pests

The stacks, reading room, exhibition area, and vault areas appear tidy and well kept, although some areas of the vault were very dusty.

Janitorial services are provided as part of the Archives' rental agreement and are usually provided on demand. Tasks like dusting are general performed by Archives staff as needed. There is not a regular cleaning schedule.

Food and drink are not permitted in the reading room or in the stacks. There is a designated eating area for staff adjacent to the stacks.

No known pest problems were reported and we did not see any evidence of pests during our site visit. There is no pest monitoring program in place, and no bug traps were observed in the Archives.

Recommended Action(s):

- Continue good housekeeping practices.
- Work with the building's landlord to create a regular cleaning schedule that includes vacuuming of carpeted areas and regular dusting of the stacks and vault.
- Establish a pest monitoring program. Sticky traps should be placed in designated areas and monitored on a set schedule. For more information, see the National Park Service's *Conserve-O-Gram 3.7 - Monitoring Insect Pests with Sticky Traps* at <https://www.nps.gov/museum/publications/conservoogram/03-07.pdf>

F. Security

Although the building is open to the public, patrons must be buzzed in by Archives staff. This includes access to the exhibition space. Security cameras monitor the front door, vault door, reading room, and each aisle of the stacks space.

A coat rack and lockers are available for patron use. Patrons are monitored by Archives staff when using materials in the reading room.



The stacks area, although closed to the public, is not walled off from the reading room. Members of the public must walk past the stacks to access the restrooms. Chains block off each aisle to prevent the public from wandering through the stacks.

The vault is a secure space that requires proximity card access to gain entry. It is kept locked when not in use.

An elevator that travels to the basement and upper floors is behind a locked door to prevent accidental access from other tenants in the building.

Recommended Action(s):

- Restrict access to the stacks to Archives staff. This could be achieved with the use of a wire mesh wall or cubicle walls if building a permanent wall is not possible.
- Plans for a future space should keep the stacks area separate from public spaces including restrooms.

G. Storage Furniture

Powder coated steel shelving is used throughout the facility. Shelving is stationary and shelves are adjustable. This type of shelving is ideal for collections materials.



Two antique wood flat file cabinets are used to house collections materials. One such cabinet is located in the State Archivist's office and is used to store rolled maps and plans. The second cabinet is located near the front entrance and is used to store flat maps and plans, most of which are not in folders. When the cabinet drawers are opened, a strong sour smell is emitted. Collections materials should not be stored in direct contact with wood because it is acidic and can damage materials. Unfortunately, many of the materials housed in these cabinets are diazotypes and blueprints, both of which are highly sensitive to pH. The strong smell emitted from the cabinets may indicate that the diazotypes are degrading as a result of the storage cabinet. While the cabinets in the State Archivist's office are lined with file folders, the cabinets located near the entrance are unlined and items are in direct contact with the wood.



Two metal flat files are located in the vault. These cabinets are not the same size and a piece of plywood is used to support the weight of the second cabinet. Three additional metal flat files are located in the State Archivist's office. All five flat file cabinets have cloth hoods that are designed to keep materials in place when drawers are opened and closed. These often get in the way when removing materials and items can be caught and creased under the depressors.



Rolled items are stored on powder coated steel shelving. The shelving is not deep enough to accommodate large rolls, which hang off the shelf unsupported putting them at risk of mechanical damage. Without adequate storage furniture, these items are also at risk for light and environmental damage. Some rolled items are also stored in drawers. While they are protected from light and dust, they may sustain damage when the drawers are opened and closed.

Many large framed items are leaning against the wall or stacked on tables in the vault. Items are on risers so that they are not in direct contact with the floor. Without adequate storage furniture, these items receive unnecessary light exposure when the vault is in use. They are also at risk for mechanical damage and may be scratched or broken during handling.

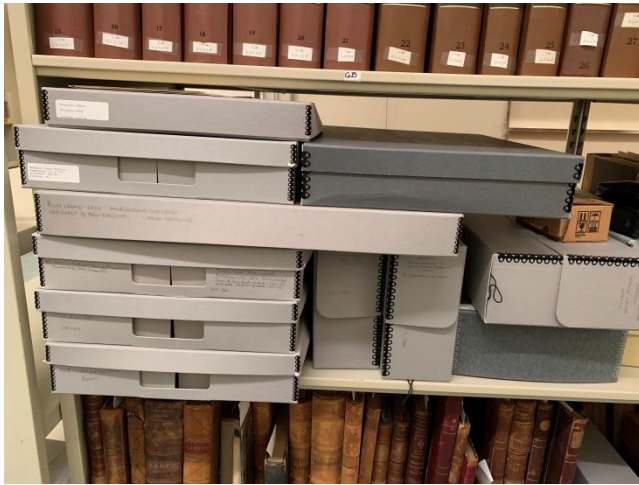
Other artifacts are stored on open shelving, directly on the vault floor, or on top of the flat files in the vault. There is no specialized storage furniture for these materials and most items lacked enclosures. A heavy layer of dust was observed on some items.

Cellulose nitrate film and negatives are stored alongside other materials in the vault. Cellulose nitrate is highly flammable and requires specialized storage conditions.

Magnetic media and film base materials are stored alongside other materials on open shelving. There is no specialized storage furniture and no designated storage area for these materials.



Oversized bound materials in the vault are currently shelved in an upright position. This may cause damage to the bindings over time. The text blocks of several volumes were sagging, and at risk of becoming detached from their bindings. Oversized bindings should lay flat to prevent damage caused by their inherent weight. If oversize volumes must be shelved upright, care should be taken to ensure that shelves are tall enough to accommodate their removal.



Shelving areas throughout the vault and stacks were overcrowded. Items were shelved on top of or in front of other items, making access difficult. This puts items at risk of damage when they are removed from the shelf for use. Items are stored on top of shelving in the vault, and on the floor in both the vault and stacks areas. This increased the risk of water damage to these materials. Where items are stored on top of shelving, the risk of damage or personal injury during retrieval is increased.

Recommended Action(s):

- Cellulose nitrate film should be stored in isolation from other materials. If a specialized cold storage room cannot be constructed, fire-proof film cabinets can be employed. For more information, see Appendix D, Section F.
- While the Archives' antique wood cabinets have a fantastic historic aesthetic, they are not ideal for storing collections materials and should be replaced with powder coated steel flat files.
- Remove cloth hoods from flat file cabinets to avoid accidental damage. When purchasing new flat files, choose a model without cloth hoods.
- Maps and architectural drawings should be stored flat whenever possible. Purchasing additional flat files would allow for increased flat storage.

- If materials must be stored rolled, they should be fully supported by the shelf. See guidelines in Appendix D, Section D.
- Framed materials should not be stored leaning against the wall. A wall mounted storage screen or modular art panel storage systems is an excellent solution for storage of framed materials. Framed items can also be stored in cubbies that will keep them off the floor and separated from one another. It may be advisable to remove items from frames for storage.
- Artifacts and objects should be fully supported on the shelf. They should not be stored directly on the floor. Museum cabinets provide excellent storage for objects and can provide additional protection from light and dust without the need for custom enclosures. For more info see the National Park Service Conserv-O-Gram 4.1 – Museum Storage Cabinets at <https://www.nps.gov/museum/publications/conservoogram/04-01.pdf>
- Many oversized volumes are currently stored upright, but would benefit from flat storage. Additional shelving for oversized bound volumes would be beneficial, especially in the vault. Volumes should not be stacked more than 3 books high.
- Provide additional shelf space to reduce overcrowding, get items off the floor, and remove items from the top of shelving.
- We acknowledge that the existing building may not be able to accommodate the majority of the above suggestions. Staff should continue to advocate for a new building with adequate storage space. For additional information about storage furniture, see Appendix D.

H. Storage Enclosures

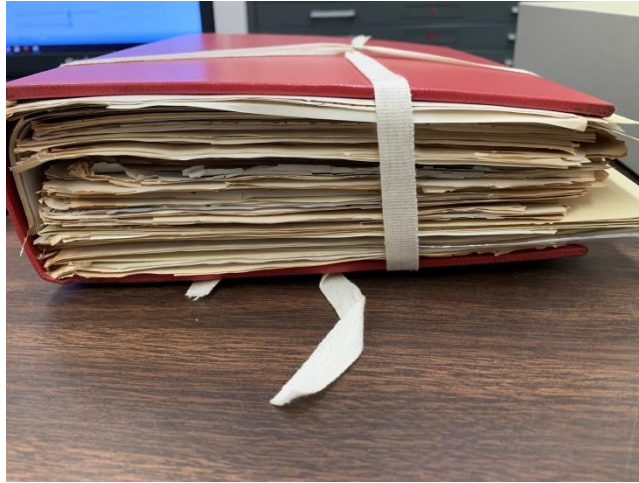
Flip top records boxes, records cartons, and metal edge boxes are used throughout the Archives. The boxes in use are good quality and ideal for foldered documents.

Fragile formats such as glass plate negatives, glass lantern slides, and film base negatives were generally housed well. It was observed that some film base negative sleeves contained more than one negative per sleeve. Negatives may stick to or abrade one another and should be sleeved individually.

Maps and architectural drawings were often without housing or in inadequate housing such as smaller file folders taped or clipped together or folders that were too small for the item.

Rolled items stored on open shelving do not have enclosures or protective wrapping.

Some items share a box although they are not related to one another. Each item or group of items should have its own housing. Many objects and artefacts lack enclosures.



The majority of fragile or damaged bound volumes do not have enclosures. Some items are tied up with linen tying tape. Custom enclosures would provide better protection from damage.

Recommended Action(s):

- Ensure that enclosures for photographs and negatives contain only one item per enclosure.
- Rehouse items stored in flat files as needed so that each item or group of item has its own appropriately sized folder.
- Store rolled items in boxes or with a protective wrapping to provide protection from light and dust.
- Order custom enclosures for fragile or damaged bound materials that are awaiting conservation. See Appendix E for guidelines.

I. Future Plans

The Archives has acknowledged that its current location is inadequate. Space for collections is extremely limited and although some records have been moved to off-site storage, inadequate storage space and overcrowding is still a problem.

A site for a new Archives building has been identified, and a building plan has been created. NEDCC recommends that the Archives and the Secretary of State continue to pursue this option.

Before the collection is moved to a new location, as much materials as possible should be housed or rehoused in appropriate custom enclosures. This will minimize the risk of damage during relocation.

IV. Condition and Conservation Needs of the Collection

During the assessment, a total of 374 (212 bound and 162) items were individually evaluated to determine their condition and conservation needs. While survey efforts were focused on the oldest and rarest items housed in the vault, items in other locations throughout the building were also evaluated.

Observations were recorded in a Microsoft Access database. A copy of the database and an Excel spreadsheet of the data accompanies this report. This data can be used by the Archives to help plan and prioritize future preservation and conservation projects.

When evaluating the condition of each item, the surveyors noted if an item could be digitized in its current condition. Bindings with severely restricted openings (less than 100 degrees), fragile or unstable materials, and materials with complex handling needs were deemed unfit for digitization without prior conservation. Of the materials surveyed, **33% cannot be digitized in their current condition.**

Items were also ranked for treatment priority based on condition. Each item was assigned a grade of low, medium or high to determine priorities for conservation treatment. These grades were assigned based on condition alone. Other factors such as frequency of use, research/historical value, and uniqueness were not considered.

35% of the collection was deemed a **high priority** for conservation based on its condition. This means that in its current state, the item is too fragile to be handled and damage will occur during its next use.

33% was determined to be **medium priority** for conservation. Repeated use will cause damage. Careful handling is required.

32% was given a **low priority** ranking, meaning it can be used without the risk of damage.

Select items are highlighted below.

The treatment proposals and costs cited below are for planning purposes only. Upon receipt at NEDCC, items will be individually examined and more precise treatment plans and costs can be generated. NEDCC does not charge non-profits for estimates.

A. C#00203 - Private Acts (Charters) and C#00210 - Public Laws, Acts and Resolutions Passed

C#00203 contains 150 bound volumes, 6 boxes of loose documents, and numerous records cartons containing foldered documents.

C#00210 contains 467 bound volumes and numerous records cartons containing foldered documents.



All 617 bound volumes are comprised of numerous documents which were adhered scrapbook-style onto support leaves that are bound into quarter leather bindings. The support leaves are acidic. The type of adhesive used is unknown. The documents are written, typed, or printed on various papers and contain a variety of media including manuscript ink, graphite pencil, colored pencil, ink stamps, and printed ink.

Each volume has flaps at the top, bottom, and fore-edge of the binding that are meant to protect the contents from light and dust.

As documents are requested for use by patrons, they are removed by Archives staff who then place the document in a folder. The foldered items are then inserted into the binding so that the order is preserved. Documents may have experienced skinning of the paper or small tears during removal. The additional thickness created by the added folders puts stress on the bindings, causing them to break apart.

Problems in all of the **617 bound volumes** include:

- Acidic support leaves that are damaging to the included documents.
- Skinning or small tears to the foldered documents.
- The adhesive has failed and some documents are detached.
- Loose documents that are at risk of becoming lost or damaged.
- Distorted or broken bindings.
- Protective flaps are cumbersome and impede access.

Other common problems include:

- Distorted or broken bindings.
- Weak sewing and page attachment.

Priority for treatment: High, based on use.

Treatment Plan A:

This approach should be carried out by a professional conservator to prevent damage to the documents.

- Collate and disbind each volume.
- Remove each document from its support page, label, and house in an archival folder.
- Surface clean documents to reduce surface dirt, mend tears as needed with Japanese paper and starch paste.
- House groups of foldered items in flip-top document boxes.
- Discard original bindings.

Note: When disbound and housed individually, the collection will need additional shelf space.

Average cost per volume: \$6,000

Approximate cost to treat all items in C#00203 and C#00210: \$3.7 million

Treatment Plan B:

This minimal approach can be carried out by archives staff.

- Collate and disbind each volume.
- Do not remove each document from its support leaf. House each leaf in an archival folder.
- House groups of foldered items in flip-top document boxes.
- Discard original binding.

Note: When disbound and housed individually, the collection will need additional shelf space.

Average cost per volume: \$500 (does not include staff time)

Approximate cost to treat all items in C#00203 and C#00210: \$309,000 (does not include staff time)

B. Vital Records Books (i.e. 1996-01, 1997-04, 1997-25, 1908-02, 1999-01, 2000-01, 2001-04, 2002-04, 2002-05, 2003-01, 2005-01, 2007-60)

Please note: the accession numbers listed above may not encompass all of the materials in this category. It was difficult for the assessors to determine shelving location for these items. It was not possible for the assessors to evaluate all items in this category so the exact number of bindings in need of repair or boxing is unknown.



Vital records books (births, deaths, marriages) are bound in full cloth stationer's bindings. These oversized ledger books are heavily used and show wear and damage as a result. Entries are in a variety of formats including manuscript ink, typed ink, and printed ink. The text block is comprised of machine made paper that is sewn through the fold.

Problems seen in nearly all of the vital records books include

- Surface dirt.
- Minor tears and brittle/cracked edges.
- Detached or partially detached pages.

Other common problems include:

- Failed sewing with nearly every page detached.
- Some items share a box with another volume.
- Damaged spine labels.

Priority for treatment: High, based on use and condition

Overview of recommended conservation:

- All vital records should be prioritized for digital imaging due to their high level of use.
- For items where the majority of pages are detached, the volume should be rebound in a new binding.
- If rebinding is not feasible due to cost, each volume should receive its own custom enclosure.

Approximate cost per volume to rebind: \$3,000-\$5,000

Approximate per volume to box: \$15

C. Framed Items

The vault contains 30 framed items that lack proper storage or housing.

23 framed items are leaning against two different walls. All are elevated off the floor on a pallet. Most items are leaning against the wall but are elevated off the floor. All 23 items are oversized.

Of these, 19 items are architectural drawings housed in aluminum frames. None are matted. The architectural drawings were created using a variety of media including:

- 13 black/cool grey lines, some dulled, yellowed support, lined with textile, hand-applied polychrome media, iron gall ink notations, stamps
- 1 dull brown lines, yellowed support, hand-applied polychrome media, black manuscript notations
- 1 blueprint
- 2 graphite and colored dry media drawings on yellowed laid paper
- 2 graphite drawing on darkened wove paper

4 items housed in wooden frames are also leaning against the wall. These include:

- 1 watercolor, yellowed, matted, in slip case
- 1 intaglio, no glazing, no mat, Masonite backing board
- 1 banner, no mat
- 1 embroidered silk hanging, no mat

7 items stacked on top of the flat files include:

- 1 framed Declaration on flat file, needs to be housed in box (see database)
- 1 framed facsimile of Declaration on flat file, needs to be housed in box (see database)
- 4 framed drawings (or facsimiles of drawings?) on file flat, need to be housed in box (see database)
- Framed stone from the House of Commons, needs to be housed in box (see database)

Problems seen in these items include:

- Damage that was not repaired prior to framing (i.e. surface dirt, tears, creases).
- Yellowed and bowed Plexiglas. It is unknown if the Plexiglas contains a UV glazing.
- Many items were not matted during framing and are in direct contact with the glass/Plexiglas. Items may become stuck to the glass/Plexiglas, causing serious damage.
- Materials used in frame construction and frame package are known to cause damage to materials and therefore not suited for long-term storage.

Recommended treatment:

- Assess all items to determine if frame storage is required/desired. Items that are good candidates from framed storage include those that are too fragile to be handled, are frequently displayed, or items where the frames have artefactual value.
- Assess all items that will remain framed to determine if the frame and frame package is suitable for long-term storage. Reframe items according to preservation standards as necessary. See Appendix D, Section F for more information.

- Create a dedicated storage area for framed items that provides protection from light, dust, and accidental damage. Possible options include hanging storage racks, cubbies, or drawers. See Appendix D, Section F for more information.
- If framed storage is not required/desired, remove items from their frames for storage. Contact a conservator for assistance with removing items from their backing boards. Paper-based items should be foldered and stored flat. Textiles should be wrapped in tissue and housed in archival boxes. Avoid folding textiles for storage to prevent creasing.

Approximate cost per item to remove frames and rehouse: \$700-\$1000

Approximate cost to reframe according to preservation standards: \$3,000-\$4,000

Approximate cost to treat all 30 framed items: \$21,000-\$120,000

V. Conclusion & Priorities

Summary of Building, Environment, and Storage Conditions

The current location at 337 Westminster streets lacks adequate space for its collections. As a result, many items are at risk of damage due to improper storage conditions. Out of necessity, collections materials are being stored directly on the floor or on top of shelving. This puts these items at risk of sustaining water damage. Because the Archives is located in a floodplain, it is extremely important that items be stored at least 4" off the floor.

Although the shelving at the Archives is well suited to the storage of records boxes and bound volumes, there is inadequate storage for oversized bound materials, rolled documents, oversized paper artefacts, objects, framed items, film base materials, and audiovisual materials.

While the majority of unbound records are nicely housed and arranged, other formats lack proper enclosures and are at risk of damage from light, dust, and atmospheric pollution.

Environmental conditions in the vault are stable and well suited the storage of books and paper-based items. However, the vault also contains a variety of other formats including magnetic media, audio recordings, film, glass plate negatives, lantern slides, and film base negatives. Cold storage is recommended for these items, especially in the case of nitrate film, which is highly flammable. Environmental conditions in other areas are not monitored.

Fluorescent lighting is used throughout the Archives. U/V filtering sleeves are not in use and light levels are not monitored. Although some areas are kept dark when not in use, some areas of the collection are exposed to light during regular business hours.

Summary of Condition and Conservation Needs

Based on our survey data, approximately **33% of the collection cannot be digitized in its current condition**. Conservation is required to address fragile or badly damaged materials, tightly bound volumes and rolled, maps, and items with special handling concerns.

35% of the collection was deemed a **high priority** for conservation based on its condition. This means that in its current state, the item is too fragile to be handled and damage will occur during its next use.

33% was determined to be **medium priority** for conservation. Repeated use will cause damage. Careful handling is required.

32% was given a **low priority** ranking, meaning it can be used without the risk of damage.

Summary of Recommended Actions

General Preservation:

- Expand environmental monitoring to include all storage and exhibit areas, and upgrade environmental monitoring hardware and software.
- Add UV filtering sleeves to exhibiting fluorescent tube light OR replace fluorescent lighting with LED fixtures.
- Secure the stacks so that members of the public cannot access this area without supervision.
- Establish an insect and pest monitoring program.

Storage Enclosures:

- House or rehouse items stored in flat files as needed so that each item or group of item has its own appropriately sized folder.
- Order custom enclosures for bound volumes that are fragile or damaged.
- Where rolled storage is required, house each roll in a box or protective wrapper.
- House objects in boxes to provide protection from light and dust.

Storage Furniture:

- Replace wood storage cabinets with metal flat files.
- Store rolled items flat whenever possible. Additional flat storage is required to accommodate this material.
- Purchase deeper shelving to accommodate large rolled items and oversized bound materials.
- Isolate film base and audiovisual materials and house in cold storage.
- Ensure that blueprints and diazotypes are stored separately from other materials.
- Store framed materials on a museum storage rack or in a vertical storage unit.
- Provide adequate storage space so that all collections materials can be stored on shelving (not on the floor or on top of shelving).

Conservation:

- Develop a multi-year plan to address conservation needs of the collection. This should include dedicated funds for conservation.
- Prioritize materials for conservation based on condition, use, and value.

- Once individual items or collections have been identified for conservation, items can be sent to NEDCC for formal proposals and costs estimates. Estimates are provided to non-profit organizations at no cost. Some high-priority collections are outlined in Section IV of this report.

It will not be possible to address all of the preservation and conservation needs of the collection in a single year. A multi-year plan that includes dedicated funding for preservation and conservation will be required to achieve the goals outlined above. We hope that the overview provided within this report can serve as a starting point when creating a multi-year plan.

We enjoyed working with the staff at the Rhode Island State Archives and it was a pleasure meeting the Secretary of State. If this report has raised any questions, or if we can provide any additional information, please do not hesitate to contact us.

Respectfully submitted,

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Appendix A: Building & Environment

The building is a collection's primary defense against the elements, making regular upkeep a foundational element of preservation. Unless the structure is sound, it cannot prevent the entrance of pests and intruders, support climate control, or protect records from fire, water, and other disasters. To ensure that their building fulfills these functions, institutions should provide regular preventive maintenance on a fixed calendar basis, with inspection of roof, gutters, skylights, flashings, and drains, and maintenance of any climate control, fire protection, and security systems. Keeping a log of building problems will preserve institutional knowledge about the building despite staff changes over time.

A. Temperature and Relative Humidity

Heat, moisture, and air pollutants act as catalysts for chemical, mechanical, and biological decay. The rate at which materials age is directly proportional to the conditions in which they are stored. Temperature and relative humidity (RH) are inextricably related: as one changes, so will the other. The inside environment is often effected by the outside environment – even with environmental controls, you can expect it to see cooler/drier conditions in the winter and warmer/wetter conditions in the summer. The key to maintaining a good environment for your collections lies in minimizing these changes over time.

While some seasonal fluctuations are to be expected, extreme or sudden changes in temperature and humidity can lead to damage. Besides accelerating chemical deterioration of collections, extreme seasonal RH fluctuations cause mechanical stress in paper as it absorbs and releases moisture in response to changing moisture levels in the surrounding environment. High RH causes image decay of film and photographs, discoloration of color film and photographs, and binder degradation in magnetic media. Moreover, humid environments put collections at risk of damage from mold (which can bloom where RH exceeds 60%), and they can be inviting to pests (e.g., silverfish) that feed on cellulose—the primary ingredient in paper. Very low RH levels (below 25%) can cause paper to become dry, brittle, and weak.

Different item types require different environmental conditions. See the table below for recommendations.

Item Type	Temperature	Relative Humidity
Books, documents, paper, b&w photographs	70°F or below	30-50%
Film, audio recordings, magnetic media, color photographs,	32-40°F	30-50%

Institutions should monitor the temperature and relative humidity of their collections storage and exhibition spaces. This data can help demonstrate the capabilities of the climate control system and provide documentation about the system's performance. This information can play an essential role in making the case for better storage conditions and strengthen grant applications.

Digital dataloggers give you the ability to continuously monitor conditions in a given area and data can easily be imported into graphs or reports. For more information about establishing an environmental monitoring program, see:

Further Reading

Adelstein, Peter Z. *IPI Media Storage Quick Reference*, 2nd ed. Image Permanence Institute: Rochester, NY, 2000. https://www.imagepermanenceinstitute.org/webfm_send/301

National Park Service. *Conserve-O-Gram 3.2 - Calibration of Hygrometers and Hygrothermographs*. <https://www.nps.gov/museum/publications/conservoogram/03-02.pdf>

National Park Service. *Conserve-O-Gram 14.10 – Cold Storage for Photograph Collections*. <https://www.nps.gov/museum/publications/conservoogram/14-10.pdf>

NEDCC. *Preservation Leaflet 2.2 - Monitoring Temperature and Relative Humidity*. <https://www.nedcc.org/free-resources/preservation-leaflets/2.-the-environment/2.2-monitoring-temperature-and-relative-humidity>

Rochester Institute of Technology. 2015. *Simplified Environmental Recommendations*. Rochester, N.Y.: Image Permanence Institute, Rochester Institute of Technology. https://www.imagepermanenceinstitute.org/webfm_send/759

B. Air Quality

Pollutants in the storage environment fall into two main categories: particulate and gaseous. Particulate matter such as dirt, dust, and fibers can stain and abrade collection materials. Gases such as sulphur dioxide and nitrogen dioxide, ozone, and peroxides catalyze chemical reactions that lead to acid formation in paper. Sulphur dioxide, which converts to sulphuric acid in the presence of moisture, causes red rot in leather bindings. Nitrogen dioxide and ozone cause fading and discoloration of photographs.

Exposure of collections to pollutants can be controlled by good building maintenance, routine housekeeping, and mechanical air filtration. Most HVAC systems now offer some level of particulate filtration. Gaseous pollutant filtration is also available; however, it requires a significant investment in equipment and maintenance. Following a regular schedule of cleaning or replacing filters will ensure that the system operates as intended. Other steps that can be taken to prevent exposure to pollutants include keeping exterior windows closed, and housing materials in protective enclosures.

C. Protection from Light

All light accelerates deterioration by providing energy to fuel damaging chemical reactions. This damage is cumulative and irreversible. While the ultraviolet (UV) spectrum of light is the most damaging, it is important to understand that visible light can also cause a great deal of damage. The extent of damage is determined by the intensity of the light and the length of exposure. Light causes paper to fade, yellow, or darken, and media to fade or change color. While all materials are vulnerable, particular care should be taken with composite objects (those made of a variety of materials such as paper, fabric, leather, inks, colorants, etc.) because each component part may have a different degree of light sensitivity.

As with studies on optimal storage environments, recent research on lighting for cultural heritage organizations has focused on improving preservation, reducing energy consumption, and increasing sustainability over time. LEDs (light-emitting diodes) have emerged as a preferred lighting option because they emit no UV, they emit very little infrared, and they reduce overall energy needs.

Institutions that are not in a position to invest the staff time and resources needed to explore retrofitting lighting systems can make a number of improvements to reduce light damage to collections. Exposure to natural lighting can be reduced through the use of blinds or curtains, or by placing UV-blocking films and panels over windows and skylights. UV-blocking sleeves and covers are available for fluorescent tubing. Display cases and frames can be fitted with UV-blocking glass or Plexiglas, and original collection materials can be substituted with high-quality facsimiles, where appropriate. Storage and exhibit areas can be fitted with timers or motion-activated lighting, and items in storage can be boxed or otherwise housed in a protective enclosure to further reduce exposure.

Further Reading

Druzik, James R., and Stefan Michalski. 2012. *Guidelines for selecting solid-state lighting for museums*. <http://www.connectingtocollections.org/wp-content/uploads/2011/08/SSL-Guidelines-Ver.-10.0.pdf>

NEDCC. *Preservation Leaflet 2.4 – Protection from Light Damage*. <https://www.nedcc.org/free-resources/preservation-leaflets/2.-the-environment/2.4-protection-from-light-damage>

Appendix B: Protection from Loss

A. Protection from Water

The best insurance against water damage is regular inspection and maintenance of the roof covering and flashings. Gutters and drains should be cleaned at least twice per year (ideally at the end of each spring and fall). Storing collections underneath water or steam pipes, lavatories, mechanical air-conditioning equipment, or other sources of water should be avoided, as should storing collections directly on the floor. Shelves or pallets should hold materials at least 4" above floor level. Water alarms should be installed in areas at high risk of seepage or flooding. It is also a good idea for staff to familiarize themselves with the location and operation of water mains and shut-off valves in the event that it is necessary to shut off the water supply during an emergency. This information should be included in an institutional disaster plan.

B. Protection from Fire

All preservation efforts become moot if collections are destroyed by fire. For this reason, it is recommended that buildings housing collection materials be equipped with a building-wide fire detection and suppression system. Fire detection devices—ideally including both smoke and heat detectors—should be wired directly to the local Fire Department or another agency where they can be monitored 24 hours a day, 7 days a week. All fire protection systems should be tested and inspected regularly.

The installation of fire sprinklers in close proximity to collections was once a subject of debate because of the risk of leakage. Today, however, building-wide fire suppression is an accepted practice. There are several reasons for this. First, wet materials can often be salvaged; burned materials cannot be. Second, sprinkler heads activate individually, and can extinguish a fire at an early stage and before it spreads to multiple rooms. A study completed in 2011 by the National Fire Protection Association (NFPA) found that 90% of structure fires are extinguished with three or fewer sprinkler heads. Third, sprinklers discharge far less water than fire hoses: the average sprinkler head discharges 20-25 gallons of water per minute in a relatively gentle spray. By contrast, fire hoses discharge between 100 to 250 gallons per minute. In the event of a fire, limited sprinkler action would cause water damage to a relatively small portion of collections, in contrast to the devastating damage resulting to both the building and collections from the deluge of pressurized water during an uncontrollable fire.

Further Reading

National Fire Protection Agency. <http://www.nfpa.org>

NFPA 12A: Standard on Halon 1301 Fire Extinguishing Systems. 2018.

NFPA 232: Standard for the Protection of Records. 2017.

NFPA 2001: Standard on Clean Agent Fire Extinguishing Systems. 2018.

NEDCC. *Preservation Leaflet 3.2 – An Introduction to Fire Detection, Alarm, and Automatic Fire Sprinklers.* <https://www.nedcc.org/free-resources/preservation-leaflets/3.-emergency-management/3.2-an-introduction-to-fire-detection,-alarm,-and-automatic-fire-sprinklers>

C. Security

Security of both the building and collections should be assessed at several levels. Building security as a whole should be considered, along with storage area protections and reading room practices. The building must be well-secured when it is closed to the public. Perimeter intrusion alarms and internal motion detectors wired directly to the local police department or to another monitoring agency are recommended. For the purpose of controlling access during working hours, as well as controlling loss of materials, it is best to limit open entrances, ideally to one used by researchers and staff alike. All other doors should be alarmed to detect unauthorized use.

Access to collections must also be controlled during working hours. To minimize unnecessary access to the building after-hours, master key systems are not recommended for collecting institutions. Building keys and keys to collections storage areas should be strictly limited. A list of key holders should be kept current, and staff members should be required to return keys when they terminate employment.

Researchers using collections should be continuously supervised to prevent theft and vandalism, and to spot accidental mishandling of materials during use.

Further Reading

Association of College and Research Libraries, Rare Books and Manuscript Section. *Guidelines Regarding Thefts in Libraries.* http://www.ala.org/acrl/standards/security_theft

NEDCC. *Preservation Leaflet 3.11 – Collections Security Planning and Prevention for Libraries and Archives.* <https://www.nedcc.org/free-resources/preservation-leaflets/3.-emergency-management/3.11-collections-security-planning-and-prevention-for-libraries-and-archives>

Appendix C: Integrated Pest Management

Dust, dirt, and paper detritus can attract pests, and may also serve as a substrate for mold growth, especially in warm or damp environments. Routine housekeeping including periodic vacuuming of floors and dusting of shelves, boxes, and books serves two important functions: it actively discourages pest infiltration and mold growth and it indicates to staff and patrons that the collections are valued.

Many pests see collections as a source of food or nesting material. Clutter and food remains attract pests, and food odor is one of the cues to pests that a space may be hospitable. Eating and drinking should be restricted as much as possible, and should be prohibited in all spaces where archival materials are stored, processed, or used.

Integrated Pest Management (IPM) focuses on addressing and correcting causes of pest infestation rather than symptoms. Strategies include routine monitoring, controlling pest habitats, identifying and sealing points of entry, and eliminating food sources to prevent infestation. The goal is to control pests using methods that are least harmful to humans, least damaging to the general environment, most likely to show concrete results, and that can be most effective with the least difficulty and cost. In most instances, a combination of strategies will offer the best solution.

Institutions should monitor storage areas for pests on a regular basis. Sticky traps can be placed in strategic areas and collected for inspection on a set schedule.

In cases where problems do not respond to preventive techniques, direct treatment for infestation may be necessary; however, due to the toxic nature of pesticides, chemical extermination for pest problems should be used only as a last resort.

Further Reading

Integrated Pest Management Working Group. "MuseumPests.net". www.museumpests.net

National Park Service. *Conserv-o-Gram 3.7 - Monitoring Insect Pests with Sticky Traps*.
<https://www.nps.gov/museum/publications/conservogram/03-07.pdf>

NEDCC. *Preservation Leaflet 3.10 – Integrated Pest Management*. <https://www.nedcc.org/free-resources/preservation-leaflets/3.-emergency-management/3.10-integrated-pest-management>

NEDCC. *Preservation Leaflet 4.3 – Cleaning Books and Shelves*.
<https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.3-cleaning-books-and-shelves>

Zachary, Shannon. 1997. "Managing a Stacks Cleaning Project". *Archival Products News* 5 (1),
www.archival.com/newsletters/apnewsvol5no1.pdf

Appendix D: Storage of Materials

Storage furniture should be chemically inert; shelves and drawer units made from powder-coated steel or anodized aluminum are the best choice.

Wood storage furniture should be avoided when possible. In the presence of moisture and oxygen, storage furniture made of wood can produce by-products that react to form acids and other damaging chemicals. This may be a serious problem in closed furniture like map cases, file drawers, locked bookcases, or exhibit cases, where pollutants can build up.

Items should be fully supported by the shelving unit to prevent damage. Specialized furniture may be required to store maps, architectural drawings, and other oversized materials.

Avoid storing materials directly on the floor or on top of shelving units to prevent water damage. Keep aisles free from unnecessary obstructions to allow for ease of movement within the storage space.

Further Reading

NEDCC. *Preservation Leaflet 4.1 – Storage Methods and Handling Practices*.

<https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.1-storage-methods-and-handling-practices>

NEDCC. *Preservation Leaflet 4.2 – Storage Furniture: A Brief Review of Current Options*.

<https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.2-storage-furniture-a-brief-review-of-current-options>

For format specific recommendations, see below.

A. Bound Materials

Shelving practices play a major role in keeping books in good condition. All books need to be supported completely by their shelves. Those that protrude past the edge can become misshapen over time, and they can easily be bumped, which can cause damage.

When possible, volumes should be stored according to size. Small volumes will not support larger ones, and can be crushed by the weight of surrounding books. Large volumes should be stored flat to prevent damage.

Volumes under 12” should be shelved upright and supported by bookends to prevent leaning. Leaning can cause distortion over time from the stress placed on bindings. Broad-edged (“non-knifing”) bookends are safer than the flat (“knifing”) variety, whose sharp edges may damage books.

Volumes over 12” tall are generally considered oversized. These are best shelved flat for overall support; placing them in stacks no more than two or three volumes high will facilitate safe handling. Alternatively, where flat shelving is not possible, oversized books can be shelved on their spines—but never on their front edges (or “fore edges”), since the weight of a book’s pages will pull the text block away from its cover.

To avoid losing thin items on the shelf, it is advisable to house them in a protective enclosure or pamphlet binder. Alternatively, large groupings or collections of booklets and pamphlets can be put into folders and stored in document boxes. Items should be stored spine down. Pamphlets of very different sizes should not be stored in the same folder.

B. Unbound Materials

Loose documents should be placed in folders which are then housed in a flip top document box or a larger records box. Choose acid-free folders with an alkaline buffer. The use of reinforced folders is not recommended because documents can get caught along the reinforced edge.

Documents stored in over-filled folders or boxes suffer damage as materials are handled and as researchers search through papers to find what they need. In general, fewer items per folder are best, especially for particularly fragile or damaged items. If a folder must hold a large group of papers (for example, a script), it should be creased along the score lines at the bottom to accommodate the greater bulk of materials. This will prevent pinching at the bottom and also prevent papers from being pushed upwards over the top of the folder where they will be at increased risk of damage from handling and from pollutants.

Folders housed in under-filled boxes will slump, causing the material inside to become curled or warped. To prevent this, a spacer can be added to keep materials upright. Pre-scored cardboard spacers are available from archival suppliers.

Polyester sleeves (commonly known as Mylar or Melinex) are helpful in protecting paper and photographic materials from direct handling and abrasion while allowing easy viewing. Used in large numbers, though, they can also add bulk and weight to collections, increasing the amount of shelf space needed to store materials. For this reason, and because these enclosures are fairly costly, it is wise to use them selectively—specifically, for items that are fragile (e.g., torn or brittle papers) or vulnerable to abrasion (e.g., photographic prints and negatives). Plastic sleeves can carry an electrostatic charge and should be avoided for items with friable media (media that lift easily from their support) such as pastels, charcoal, flaking inks, or chalk.

C. Newspapers, Clippings & Printed Ephemera

Newsprint and ephemera are generally more fragile than other paper objects, as they are often made of poor quality materials and are not always cared for to the same standards as personal or institutional records. Making sure these resources are evaluated closely for condition issues, housing them in supportive enclosures, and prioritizing them for cool, dry storage is the best way to extend their useful life. Digitization and the use of digital surrogates can reduce handling of fragile originals.

In-house photocopying onto permanent, durable paper such as Perma-Life or Purma-Dur is also an excellent way to preserve acidic paper materials, especially for those items where the value lies in the content.

D. Oversized Materials

Oversized objects of a similar type and size are best stored together in flat file cabinets or archival-quality boxes for oversized materials. Small groups of materials should be placed in archival folders cut to fit the size of the drawer or box – this prevents the folder from moving around inside the drawer.

If flat storage is not possible due to item's size or other space concerns, items may be stored rolled around a good quality tube that is taller than the item. This will provide support and protection against crushing. The use of buffered tubes is recommended for most items (blueprints and diazotypes are an exception), however the cost may be prohibitive. If unbuffered tubes are used, a piece of buffered paper or polyester film can be rolled around the tube to serve as a barrier. A piece of buffered paper or polyester should then be rolled around the outside of the item before it is secured with ties. This will ensure that the tiles do not damage the item and will provide some protection against light and dust.

Further Reading

NEDCC. *Preservation Leaflet 4.9 Storage Solutions for Oversized Paper Artifacts*.

<https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.9-storage-solutions-for-oversized-paper-artifacts>

E. Framed Materials

Framed items should be evaluated to determine if it is necessary to keep the item in its frame. Items not framed with preservation in mind generally employ materials or techniques that may damage them item. If the frame is deemed to be damaging and does not have artefactual value, considering removing prints or drawings from the frame and/or mat for flat storage.

When matting and framing items for long-term exhibition or storage, ensure that preservation-quality materials are used if the item will be stored. For more information see:

International Organization for Standardization. *ISO 18902: 2013 – Albums, Framing and Storage Materials*. <https://www.iso.org/standard/60377.html>

Library of Congress. *Preservation Guidelines for Matting and Framing*.
<https://www.loc.gov/preservation/care/mat.html>

NEDCC. *Preservation Leaflet 4.10 – Matting and Framing for Art and Artifacts on Paper*.
<https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.10-matting-and-framing-for-art-and-artifacts-on-paper>

Framed items are best stored in a vertical position. Hanging storage racks are an excellent, although expensive and space intensive solution. Vertical shelving designed for art storage is also available. Items should be kept separate from one another. Smaller framed items can be stored flat inside a flat file drawer or archival-quality box. Other items should not be stored above or below the framed piece. Trays or dividers can be placed inside drawers to prevent framed materials from sliding around and becoming damaged.

F. Photographic Materials

A stable environment is crucial to the preservation of photographic prints. High humidity or drastic changes in temperature and humidity can cause damage to the emulsion layer. This results in image degradation or loss.

Photographs should not be stored rolled or folded as this can also cause damage to the emulsion layer. Any item showing signs of degradation should be assessed for retention and, if kept, prioritized for digitization.

G. Microfilm

Microforms are commonly found on nitrate, acetate, and polyester film-bases, and may be produced using silver gelatin, diazo, and vesicular film. Knowing the film base and the type of film used in production of the microform will inform storage and handling decisions. For example, diazo films are more susceptible to light damage, while vesicular film is sensitive to pressure and heat.

Even without detailed knowledge of the film base or film type, all microforms will benefit from storage in individual, PAT-certified enclosures held in a cool or cold environment and from careful handling during use.

Further Reading

Association for Library Collections and Technical Services. 2015. *Managing microforms in the digital age*. Chicago, IL: Association for Library Collections & Technical Services, American Library Association. <http://www.ala.org/alcts/resources/collect/serials/microforms>

H. Motion Picture Film, Film Base Negatives, and Audio and Video Recordings

Film, negatives, and audio & video recordings should be kept in cold storage whenever possible.

Dust and other particulates pose a major risk to the longevity of these materials because they cause abrasion, resulting in information loss. For this reason, storage enclosures are crucial for the preservation of these materials. Gloves should be worn when handling these types of materials to prevent the transfer of dirt or fingerprints.

Motion picture films should be stored individually on a core inside appropriate canisters, and shelved horizontally. Enclosures should subscribe to ISO 18916:2007, the Photograph Activity Test (PAT), an international standard which determines whether a product is stable and appropriate for use with photographic materials.

All **cassette tapes**, **open-reel tapes**, and **discs** should be stored vertically and well-supported to prevent leaning.

All media showing signs of degradation should be isolated from other materials, prioritized for reformatting, and evaluated for retention. If the originals are kept, they should remain in isolation from other materials.

Cellulose nitrate film is highly flammable and can pose a health hazard. Additional storage, handling, and disposal guidelines should be used in conjunction with these materials. See the resources below for more information.

Further Reading

Adelstein, Peter Z. *IPI media storage: quick reference*. Rochester, NY: Image Permanence Institute, Rochester Institute of Technology, 2004. www.imagepermanenceinstitute.org/webfm_send/301

International Organization for Standardization. *ISO 18916:2007 - Photographic Activity Test for Enclosure Materials*. <https://www.iso.org/standard/31940.html>

National Fire Protection Association. *NFPA 40: Standard for the Storage and Handling of Cellulose Nitrate Film*. 2019 edition. <https://www.nfpa.org/>

National Film Preservation Foundation (U.S.). *The Film Preservation Guide: the Basics for Archives, Libraries, and Museums*. San Francisco, Calif: National Film Preservation Foundation, 2004. www.filmpreservation.org/preservation-basics/the-film-preservation-guide

National Park Service. *Conserve-O-Gram 2.20 - Handling and Shipping Cellulose Nitrate Film*. 2018. <https://www.nps.gov/museum/publications/conserveogram/02-20.pdf>

National Park Service. *Conserve-O-Gram 2.22 - Disposal of Nitrate Film*. <https://www.nps.gov/museum/publications/conserveogram/02-22.pdf>

I. Objects

Objects stored on open shelving are susceptible to damage from light, dust, and air pollutants. When possible, objects should be stored in drawers, cabinets, or custom enclosures. Enclosures should prevent damage when the item is removed from the shelf for use.

Small objects are best stored on shelves or in drawers. Shelving should be padded with archival-quality foam to prevent abrasion. If items are stored on open shelving, dust and light covers should be added.

All collections items should be at least four inches above the storage floor. This protects them from insects, moisture and cleaning equipment.

Further Reading

National Park Service. *Conserve-O-Gram 4.1 – Museum Storage Cabinets*. <https://www.nps.gov/museum/publications/conserveogram/04-01.pdf>

Appendix E: Storage Enclosures

A. Enclosures for Bound Materials

Protective enclosures facilitate intellectual control of collections by providing a means of keeping like materials together, slow chemical deterioration caused by light exposure, limit water damage in the event of a disaster, and protect against dust and pests.

Paper enclosures should be acid-free and lignin-free, and in most cases, buffered with an alkaline reserve. The purpose of the buffer is to neutralize acids as they form in storage materials through contact with acidic items and atmospheric pollution.

Boxes that are significantly larger than their contents will allow items to shift, making damage more likely to occur as the box is moved on and off the shelf. Custom-fitted boxes are recommended for bound materials.

Although custom boxes can be made in house, this task requires time, space, equipment, and staff. Unless your institution has a dedicated preservation or conservation lab, it is more economical to order custom-fitted boxes from a vendor. Custom-fitted boxes can be ordered from several vendors including:

Custom Manufacturing Inc. - <http://www.archivalboxes.com/>

The average cost per box is about \$10 per box.

Talas - <https://www.talasonline.com/archival-storage/boxes/custom-enclosures>

Several different styles and types of board are available. The average cost is about \$10 per box.

Further Reading

NEDCC. *Preservation Leaflet 7.4 – Custom Protective Enclosures*. <https://www.nedcc.org/free-resources/preservation-leaflets/7.-conservation-procedures/7.4-custom-protective-enclosures>

B. Enclosures for Paper and Photographs

All enclosures used to house photographs should meet the specifications provided by the International Organization for Standardization (ISO). ISO Standard 18902:2013 and ISO 18916:2007 provide specifications on enclosure formats, papers, plastics, adhesives, and printing inks, and require that storage materials pass the Photographic Activity Test (PAT).

Folders, when used inside a box, file cabinet or flat file, should be sized to the interior dimensions of the housing, not to the dimensions of the folder contents. This will prevent contents from sliding out of folders during use. For most material, unreinforced, buffered folders are preferable. (Reinforced folders have a stiff edge on the interior that can catch on documents causing damage to fragile paper.)

Certain types of material including color photographs, blueprints, cyanotypes and diazotypes, should not be stored in buffered folders. For this material, a folder that has passed the Photographic Activity Test (PAT) should be used.

Polyester film sleeves are useful for housing fragile documents or documents that will be frequently handled. L-sleeves, which are sealed on two adjacent sides and open on the other two sides, are the most frequently used type, although many other variants can be found. If acidic paper objects are to be placed in film sleeves, the objects should either be alkalized first or a sheet of buffered paper should be included in the sleeve with the object. Film sleeves are also a good option to protect photographs from fingerprints or to keep alkaline-sensitive objects from coming into contact with buffered objects or folders. Polyester film sleeves are not a good storage option for items with friable media, like charcoal or pastels, because the static charge from the sleeve can displace the media. Sleeves should be heat- or ultrasonically welded; double-sided tape should not be used since adhesives can ooze and come into contact with documents within.

Further Reading

International Organization for Standardization. *ISO 18916:2007 - Photographic Activity Test for Enclosure Materials*. <https://www.iso.org/standard/31940.html>

NEDCC. *Preservation Leaflet 5.5 - Storage Enclosures for Photographic Materials*. <https://www.nedcc.org/free-resources/preservation-leaflets/5.-photographs/5.5-storage-enclosures-for-photographic-materials>

Appendix F: Handling Collections Materials

A. Handling During Use

Damage to collections materials can be prevented by training staff and researchers alike in proper handling techniques for the different types of materials in the collection. Supervising researchers will provide staff with an opportunity to spot and correct any accidental mishandling, and is also a good security practice. Signage reminding staff and researchers of basic good practices, such as using only pencil, can also be helpful.

Book cradles provide support for bindings during use and can prevent covers from becoming detached.

Snake weights can hold the pages of a book open during use.

Gloves should be provided for use when handling photographs, films, or textiles to prevent fingerprints or dirt from transferring to materials. The use of gloves is not suggested when handling bound materials or other paper-based materials. Gloves inhibit the user's tactile sense which leads to unintentional damage to pages as they catch on the gloves or as the wearer attempts to turn pages. **Cotton gloves** are reusable but should be washed when they become visibly dirty to prevent the transfer of dirt. When worn for long periods of time, finger oils may penetrate the cotton. **Nitrile gloves** do not allow finger oils to penetrate and provide a better tactile experience. Nitrile gloves are a single use items and should not be reused.

B. Handling During Processing

When processing materials any acidic inserts (e.g., bookmarks, scraps of paper, etc.) should be removed so that the acid they contain does not migrate and cause staining. For books that will be retained permanently in a collection, identifying information is best placed on acid-free, lignin-free, buffered paper flags inserted between the volume's first page and front flyleaf. These are available from conservation suppliers.

Adhesive labels, such as sticky notes, can stain or otherwise disfigure collections, and should be avoided. While the tacky portion of the note seems quite weak, it bonds well enough to tear brittle paper when removed. Even when items are not torn by sticky note removal, residual adhesive can cause staining and will attract dust and dirt. On a practical level, sticky notes often come loose, effectively rendering any descriptive information on them useless. A better option if the item is thin enough would be foldering and labeling the folder or, if the item is thicker or bound, inserting a book flag.

Most fasteners crimp pages and lead to permanent structure changes. Although often made of chemically stable materials, plastic clips exert too much pressure on the papers they hold. This is especially problematic for brittle or weakened papers, which can be easily torn.

Appendix G: Working with a Conservator

Clear curatorial priorities and well-defined conservation goals are critical to achieving the greatest benefit possible within your conservation budget. Some criteria to consider when making decisions about conserving a book can include:

- Importance to the mission of the institution
- Value based on intellectual, historical or associational significance
- Uniqueness, rarity or high replacement cost
- Need to maintain access to the content and to the original object
- Use in exhibition or teaching

There are often a variety of ways to approach the conservation of a bound volume. Understanding why an object is important to the collection, and knowing how you intend to use and store it in the future will help you and your conservator make appropriate treatment choices.

In general, an appropriate conservation treatment should:

- Begin with a conversation between the owner or steward of the object and the conservator about goals for treatment and expectations for the finished product;
- Address the long-term physical and chemical stability of the object as a whole;
- Take into account the intended use of the object (i.e. exhibition, use in curriculum) and the storage environment;
- Use techniques, materials, structures and enclosures that are appropriate for the specific object;
- Include written and photographic documentation of the treatment.

When creating a treatment proposal, the conservator will need to examine the item in person and may need to perform non-destructive testing of the paper, inks, and adhesives.

Further Reading

American Institute for Conservation. “Find a Conservator” Tool
<https://www.culturalheritage.org/membership/find-a-conservator>

American Institute for Conservation. *Hiring a Conservation Professional*.
<https://www.culturalheritage.org/membership/find-a-conservator/hiring-a-conservation-professional>

NEDCC. *Preservation Leaflet 7.7 – Choosing and Working with a Conservator*.
<https://www.nedcc.org/free-resources/preservation-leaflets/7.-conservation-procedures/7.7-choosing-and-working-with-a-conservator>

Bibliography

Adelstein, Peter Z. *IPI Media Storage Quick Reference*, 2nd ed. Image Permanence Institute: Rochester, NY, 2004. https://www.imagepermanenceinstitute.org/webfm_send/301

American Institute for Conservation “Find a Conservator” Tool
<https://www.culturalheritage.org/membership/find-a-conservator>

American Institute for Conservation. *Hiring a Conservation Professional*.
<https://www.culturalheritage.org/membership/find-a-conservator/hiring-a-conservation-professional>

Association for Library Collections and Technical Services. 2015. *Managing microforms in the digital age*. Chicago, IL: Association for Library Collections & Technical Services, American Library Association. <http://www.ala.org/alcts/resources/collect/serials/microforms>

Association of College and Research Libraries, Rare Books and Manuscript Section. *Guidelines Regarding Thefts in Libraries*. http://www.ala.org/acrl/standards/security_theft

Druzik, James R., and Stefan Michalski. *Guidelines for selecting solid-state lighting for museums*. 2012. <http://www.connectingtocollections.org/wp-content/uploads/2011/08/SSL-Guidelines-Ver.-10.0.pdf>

Hatchfield, Pamela. "Choosing Materials for Museum Storage." *In Storage of Natural History Collections: Basic Concepts*, Carolyn L. Rose and Catherine A. Hawks, eds. Pittsburgh, PA: Society for the Preservation of Natural History Collections, 1994.

Integrated Pest Management Working Group. “MuseumPests.net”. www.museumpests.net

International Organization for Standardization. *ISO 18902: 2013 – Albums, Framing and Storage Materials*. <https://www.iso.org/standard/60377.html>

International Organization for Standardization. *ISO 18916:2007 - Photographic Activity Test for Enclosure Materials*. <https://www.iso.org/standard/31940.html>

Library of Congress. *Preservation Guidelines for Matting and Framing*.
<https://www.loc.gov/preservation/care/mat.html>

National Film Preservation Foundation (U.S.). *The Film Preservation Guide: the Basics for Archives, Libraries, and Museums*. San Francisco, Calif: National Film Preservation Foundation, 2004.
www.filmpreservation.org/preservation-basics/the-film-preservation-guide

National Fire Protection Agency. <http://www.nfpa.org>

NFPA 12A: Standard on Halon 1301 Fire Extinguishing Systems. 2018.

NFPA 40: Standard for the Storage and Handling of Cellulose Nitrate Film. 2019.

NFPA 232: Standard for the Protection of Records. 2017.(Replaces NFPA 232A: Guide for Fire Protection for Archives and Records Centers).

NFPA 2001: Standard on Clean Agent Fire Extinguishing Systems. 2018.

National Information Standards Organization. *ANSI/NISO Z39.79 - 2001 Environmental Conditions for Exhibiting Library and Archival Materials.*

https://groups.niso.org/apps/group_public/download.php/6482/Environmental%20Conditions%20for%20Exhibiting%20Library%20and%20Archival%20Materials.pdf

National Park Service.

Conserve-O-Gram 2.20 - Handling and Shipping Cellulose Nitrate Film. 2018.

<https://www.nps.gov/museum/publications/consveogram/02-20.pdf>

Conserve-O-Gram 2.22 - Disposal of Nitrate Film.

<https://www.nps.gov/museum/publications/consveogram/02-22.pdf>

Conserve-O-Gram 3.2 - Calibration of Hygrometers and Hygrothermographs.

<https://www.nps.gov/museum/publications/consveogram/03-02.pdf>

Conserve-O-Gram 3.7 - Monitoring Insect Pests with Sticky Traps.

<https://www.nps.gov/museum/publications/consveogram/03-07.pdf>

Conserve-O-Gram 4.1 – Museum Storage Cabinets.

<https://www.nps.gov/museum/publications/consveogram/04-01.pdf>

Conserve-O-Gram 14.10 – Cold Storage for Photograph Collections.

<https://www.nps.gov/museum/publications/consveogram/14-10.pdf>

NEDCC. *Preservation Leaflets.*

2.2 - Monitoring Temperature and Relative Humidity. <https://www.nedcc.org/free-resources/preservation-leaflets/2.-the-environment/2.2-monitoring-temperature-and-relative-humidity>

2.4 – Protection from Light Damage. <https://www.nedcc.org/free-resources/preservation-leaflets/2.-the-environment/2.4-protection-from-light-damage>

2.5 - Protecting Paper and Book Collections During Exhibition. <https://www.nedcc.org/free-resources/preservation-leaflets/2.-the-environment/2.5-protecting-paper-and-book-collections-during-exhibition>

3.2 – An Introduction to Fire Detection, Alarm, and Automatic Fire Sprinklers. <https://www.nedcc.org/free-resources/preservation-leaflets/3.-emergency-management/3.2-an-introduction-to-fire-detection,-alarm,-and-automatic-fire-sprinklers>

3.10 – Integrated Pest Management. <https://www.nedcc.org/free-resources/preservation-leaflets/3.-emergency-management/3.10-integrated-pest-management>

3.11 – Collections Security Planning and Prevention for Libraries and Archives. <https://www.nedcc.org/free-resources/preservation-leaflets/3.-emergency-management/3.11-collections-security-planning-and-prevention-for-libraries-and-archives>

4.1 – Storage Methods and Handling Practices. <https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.1-storage-methods-and-handling-practices>

4.2 – *Storage Furniture: A Brief Review of Current Options*. <https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.2-storage-furniture-a-brief-review-of-current-options>

4.3 – *Cleaning Books and Shelves*. <https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.3-cleaning-books-and-shelves>

4.10 – *Matting and Framing for Art and Artifacts on Paper*. <https://www.nedcc.org/free-resources/preservation-leaflets/4.-storage-and-handling/4.10-matting-and-framing-for-art-and-artifacts-on-paper>

5.5 - *Storage Enclosures for Photographic Materials*. <https://www.nedcc.org/free-resources/preservation-leaflets/5.-photographs/5.5-storage-enclosures-for-photographic-materials>

7.4 – *Custom Protective Enclosures*. <https://www.nedcc.org/free-resources/preservation-leaflets/7.-conservation-procedures/7.4-custom-protective-enclosures>

7.7 – *Choosing and Working with a Conservator*. <https://www.nedcc.org/free-resources/preservation-leaflets/7.-conservation-procedures/7.7-choosing-and-working-with-a-conservator>

Rochester Institute of Technology. *Simplified Environmental Recommendations*. Rochester, N.Y.: Image Permanence Institute, Rochester Institute of Technology, 2015.
https://www.imagepermanenceinstitute.org/webfm_send/759